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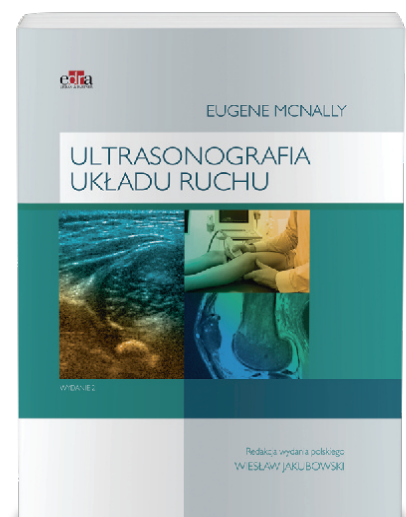
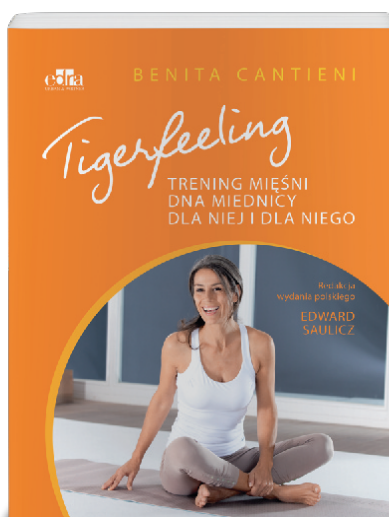
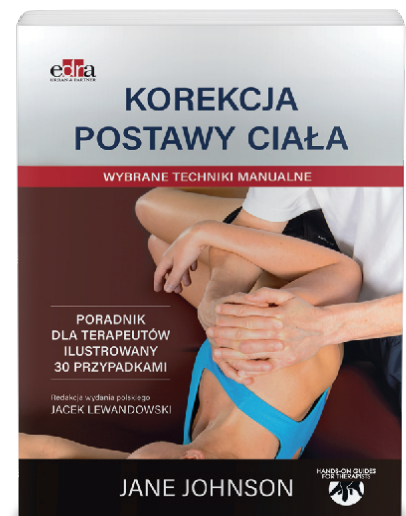
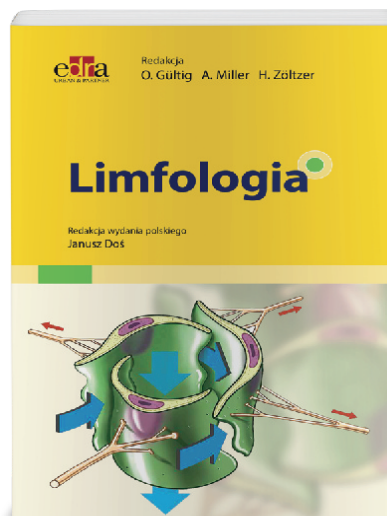
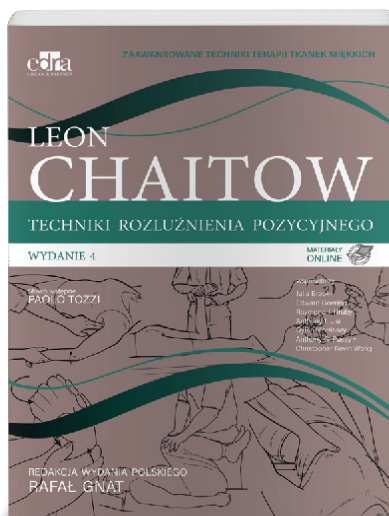
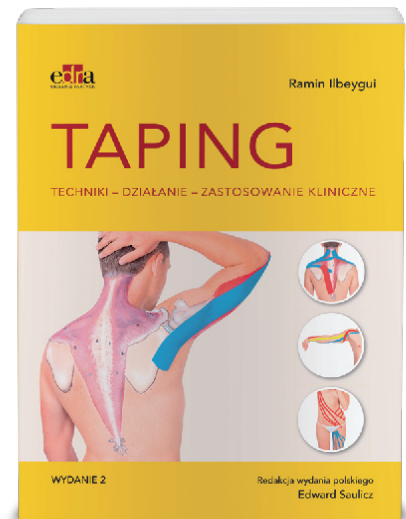
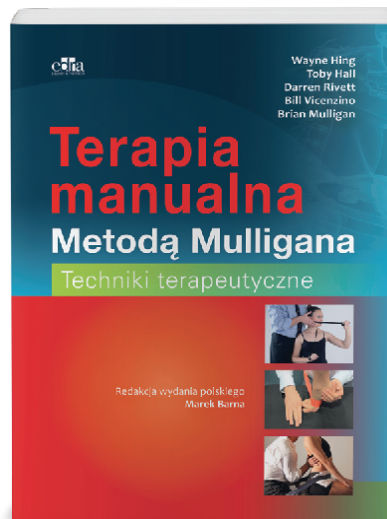


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Characteristics of injuries and injuries of water polo players

水球选手的运动伤害特性

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Streszczenie

Wstęp. Uraz sportowy określany jest najczęściej pojęciem kontuzji. Jest urazem, którego można doznać podczas uprawiania aktywności fizycznej, o charakterze sportowym, głównie w czasie treningów i zawodów, powodujący wystąpienia obrażenia sportowego, którego następstwem jest wyłączenie czasowe lub całkowite z dalszego udziału w aktywności sportowej.

Cel pracy. Celem pracy jest ocena charakterystyki występowania kontuzji wśród piłkarzy wodnych.

Materiał i metoda. Badania zostały przeprowadzone w oparciu o metodę sondażu diagnostycznego opracowanego przez autorów, za zgodą trenera i zawodników. Ankietę zawierała 20 pytań zarówno otwartych jak i metryczkowych. Pytania dotyczyły doznanych urazów, oraz ich fizjoterapii.

Badaniem objęto 52 zawodników należących do polskich klubów sportowych w wieku od 15 do 30 lat trenujących waterpolo nie krócej niż 5 lat.

Wyniki. Żaden z badanych zawodników w trakcie kariery nie doznał więcej niż 15 kontuzji, jednakże 100% zawodników doznało przynajmniej jednej. Najczęstszą sytuacją, w jakiej zawodnicy doznawali kontuzji był trening w wodzie - 75%. Po urazie badani piłkarze wodni niestety aż w 42% przypadków nie korzystali z pomocy fizjoterapeutów. Badani piłkarze wodni najczęściej doznawali urazu stawu barkowego - 35,1%, 26,4% to urazy palców dłoni, 17,5% nadgarstka, a 10,5% łokcia.

Wnioski. 1. Najczęściej do urazów dochodziło podczas treningów w wodzie, co przekłada się na zbyt małą rzetelność przeprowadzonej rozgrzewki oraz, nieprawidłowo wykonywanie ćwiczeń przez zawodników. 2. Najbardziej narażonymi na urazy częściami ciała są stawy barkowe, nadgarstka i palców dłoni. 3. Piłka wodna jest grą kontaktową o dużej urazowości, dotyczącej uszkodzeń torebek stawowych, naciągnięć więzadeł i mięśni w/w części ciała. 4. Zwiększenie świadomości oraz dostępu do profesjonalnej fizjoterapii pozwoli zawodnikowi na szybszy powrót do formy sprzed urazu oraz zapobiegnięciu kolejnym kontuzjom.

Słowa kluczowe:

piłka wodna, uraz sportowy, fizjoterapia w sporcie

Abstract

Introduction. Sports injury is usually referred to as contusion. It is an injury that can be experienced during physical activity, of a sporting nature, mainly during training and competitions, causing sports injuries, which results in a temporary or total exclusion from further participation in sports activities.

Objective. The objective of the article is to assess the characteristics of injuries among water polo players.

Material and method. The study was carried out on the basis of the diagnostic survey method developed by the authors, with the consent of the coach and players. The questionnaire contained 20 questions, both open and metric. The questions concerned injuries and physiotherapy. The study involved 52 players of Polish sports clubs aged 15 to 30 who have played water polo for not less than 5 years.

Results. None of the studied players during their career had more than 15 injuries, however 100% of players suffered at least one injury. The most common situation in which players experienced injuries was training in the pool - 75%. After injury, in 42% of cases the examined water polo players unfortunately did not use physiotherapists. The studied water polo players most often suffered an injury of the shoulder joint - 35.1%, 26.4% of fingers, 17.5% of wrists, and 10.5% of elbows.

Conclusions. 1. Most often injuries occurred during training in the pool, which arises from low reliability of warm-ups and exercises being incorrectly performed by the players. 2. The most vulnerable parts of the body are shoulder, wrist and finger joints. 3. Water polo is a contact sport with a high level of the incidence of traumas, causing damage to joint capsules, stressing ligaments and muscles in the above-mentioned parts of the body. 4. Increasing awareness and access to professional physiotherapy will allow athletes to return to fitness levels as before the injury more quickly and prevent further injuries.

Key words:

water polo, sports injury, physiotherapy in sport

摘要

前言。运动伤害通常被称为损伤，为进行运动性质的体能活动时可能经历的，主要发生在训练和比赛期间，因而造成运动伤害，导致被暂时或完全排除体育活动的参与。研究目的。研究目的在评估水球选手受伤发生的特性。材料和方法。该研究以作者设计的诊断调查法为基础，在教练和选手同意下进行。问卷包括 20 个开放性问题及受访者资料的问题，这些问题涉及其受伤情况及理疗方式。该研究涵盖 52 名 15 至 30 岁间的波兰体育俱乐部选手，加入水球训练的时间超过 5 年。结果。参与研究的选手的职业生涯中受伤次数在 15 以下，然而 100% 的选手至少都受过伤过一次，选手最常受伤的状况为水中训练时，达 75%，可惜受伤的球员中高达 42% 未接受物理治疗师的协助。受试水球选手最常遭受的伤害为肩关节损伤，达 35.1%，手指受伤为 26.4%，手腕 17.5% 而手肘占 10.5%。

结论

1. 受伤最常发生在水中训练时，此意味球员的热身不足且运动方式不正确
2. 身体最容易受伤的部位为肩关节、手腕和手指
3. 水球是一种接触性游戏，容易造成关节囊、韧带拉伤及这些身体部位肌肉伤害的运动。
4. 提高意识并接受专业理疗将使运动员更快回到受伤前的状态并避免再度受伤。

关键词：

水球、运动伤害、运动理疗

Introduction

History

Water polo as a sport discipline was founded in the late nineteenth century in Great Britain. The Scots are considered to be the protoplasts, because the first principles of the game were developed by a Scot - William Wilson in 1876, and these principles were proclaimed by the London Swimming Association. At that time, the premiere competitions were organized.

Since 1900 (Summer Olympic Games in Paris) water polo for men has been an Olympic discipline. The first women's competition was played during the Sydney Games in 2000.

The Men's European Championships have been organized since 1926, the Men's World Championships since 1979, and the Men's World League since 2002. Since 1979, the men's and the women's World Cup has been held. The development of water polo is managed by the Technical Water Ball Committee at the International Swimming Federation (FINA).

Water polo in Poland is organizationally subject to the Autonomous Water Ball Committee at the Polish Swimming Association, founded in 1922. It came to Poland from Austro-Hungary and before the outbreak of the First World War it was played in Galicia. After Poland regained independence, the first water polo clubs started to be established, and two centers dominated: Kraków and Lviv.

Regular competitions have been organized since 1923, and the championship of Poland has been run since 1925 with a break between 1940-45. Currently, there are over a dozen water polo clubs in Poland.

The greatest achievement of the national team is winning the Group B European Championships in Stockholm in 2002. Currently, Robert Serwin (long-time player and captain of the national team, led by Edward Kujawa) is the manager and head coach of the Polish water polo team [1, 2].

Water polo principles

Water polo is a team sport discipline practiced all over the world – both by women and men - in which two teams take part, 7 players each, including a goalkeeper, up to 6 players can stay on the bench.

Changes are made in a special zone at the goal at any time of the game. The goalkeeper of the attacked team cannot be changed after a penalty shot is awarded, and before its execution. Players must not have any substances like fat or oil on their bodies.

The sport of water polo is played at a swimming pool with a minimum water depth of 180 cm (however, it is recommended to play games in the pool at least 200 cm deep), with a playing field with dimensions of 20x30 m and goals of 3 x 0.9 m. The goal of the game is to throw the ball 21.6-22.6 cm in diameter into the opponent's goal.

The game consists of four quarters, 8 minutes of effective play each. If it is necessary to select the winner from a draw an additional two 3 minute halves are played. If the teams are still drawn, a series of penalty throws is conducted – five throws for each team [3].

Sports injury

A sports injury is usually referred to as contusion. It is an injury that can be experienced during physical activity, of a sporting nature, mainly during training and competitions, causing sports injuries, the consequence of which is temporary or total exclusion from further participation in sport – in training or competition at least one day after an event that caused the injury. According to data, various types of injuries related to sport constitute approx. 18% of all injuries in which hospital treatment was required. However, it is worth noting that as many as 70% of sports injuries arise during non-organized activities [4].

Injuries caused by overload constitute the result of excessive and repetitive forces that cause micro-injuries. Microscopic damage appears faster than the end of the healing and regeneration process. The consequences are inflammation, loss of ligament integrity, tendon inflammation, tendon rupture, fatigue, and muscle dysfunction [5, 6, 7, 8].

Most common injuries***Dislocation / subluxation of the shoulder***

Subluxation of the shoulder involves dislocation of the joint surfaces of the bones in relation to each other, but without loss of contact, while dislocation is connected with the loss of contact. Most often it occurs when a player with an upright hand or a hand over the head is blocked, so the arm stops in place and at the same time the player's body moves forward.

Inflammation of the medial epicondyle of the humerus

Applies to young athletes. A lopsided setting of the bent elbow causes tension of the structures on the lateral side. This can lead to an upsetting of the growth plate near the medial epicondyle of the humerus.

Wrist injuries

Sprain affects wrist ligaments, which may be overstressed (slight distortion), partially torn or torn. Sprains lead to instability of a joint because two rows of wrist bones are not properly maintained. Dislocation connected with a sprain causes the loss of contact of bone joint surfaces.

Finger injuries

Finger sprains are most often caused due to contact with another player. Injuries occur most often in the proximal interphalangeal joint, by twisting the ligaments of the joint.

Finger dislocation involves temporary or permanent loss of contact of joint surfaces. It may be connected with damage to soft tissue (joint capsule ligament). Dislocations are the result of contact of a twisted or excessively straightened finger with external force from another player or the ball [9].

Muscle injury classification

1. Mild post-workout injury - rupture of several muscle fibers, slight swelling and discomfort with or without minimal loss of strength and function.

2. Moderate post-workout damage (second degree) tearing of many muscle fibers, slight swelling and discomfort with moderate loss of strength and function (second type of damage causes intramuscular hematoma disturbing the integrity of the fascia).

3. Acute post-workout injury (third degree) - severe muscle damage with severe loss of strength, stretching throughout the abdominal muscle, advanced dysfunction [9].

Objective

The objective of the article is to assess the characteristics of injuries among water polo players and:

- analysis of the number of injuries sustained by players
- analysis of the most contiguous structures of water polo players
- analysis of the circumstances of injuries
- analysis of the use of physiotherapy treatments to accelerate treatment of injuries.

Material and method

The study was carried out on the basis of the diagnostic survey method developed by the authors, with the consent of the coach and players. The questionnaire contained 20 questions, both open and metric, concerning injuries and physiotherapy. The study involved 52 athletes of Polish sports clubs aged 15 to 30 (average 17.44 years, SD 3.45), participating in water polo for not less than 5 years (average 7.65 years, SD 3.79) (tab.1).

The study was carried out from January to April 2017.

Table 1. Characteristics of the examined group

Wiek [lata] Age [years]	Treningi [lata] Trainings [years]	N	%
15	5	23	44.23
16	6	7	13.45
17	7	5	9.62
18	8	3	5.77
19	10	3	5.77
19	9	2	3.85
21	12	2	3.85
23	14	4	7.69
26	16	2	3.85
30	22	1	1.92

Results

During their career none of the examined players had more than 15 injuries, however 100% of players suffered at least one. Most often 62.5% had less than 5 injuries, 1/3 - 34.5% suffered between 5 and 10 injuries, and 3% suffered between 10 and 15 injuries (Fig.1).

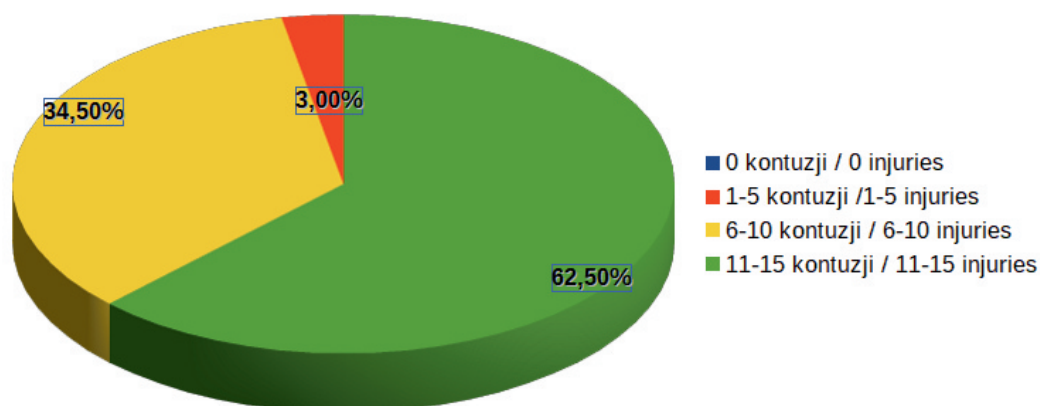


Fig.1. Analysis of the number of injuries sustained by players during their sporting career

The most common situation in which players experienced injuries was training in the pool - 75%, 20% of all injuries occurred during the competition, 4% of injuries occurred during training activities other than at the pool (e.g. at the gym). Only 1% of injury were suffered during warm-ups (Fig 2).

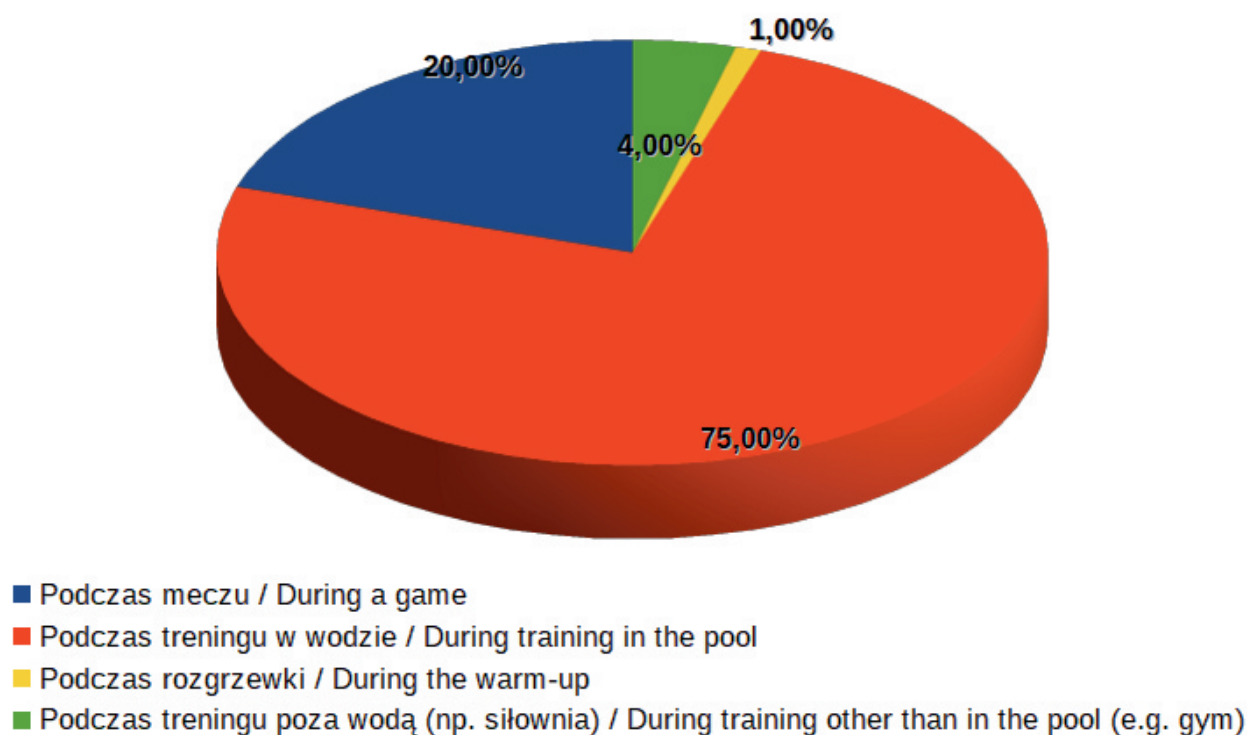


Fig. 2. Analysis of the circumstances of injuries suffered by players

Most frequently water polo players from the examined group suffered shoulder joint injuries - 35.1%, 26.4% suffered finger injuries, 17.5% suffered wrist injuries, and 10.5% - elbow injuries. 89.5% of all injuries experienced were injuries of an upper limb. Other knee and hip injuries occurred in 3.5% of cases, other injuries occurred in 3.5% of players, too (Fig. 3).

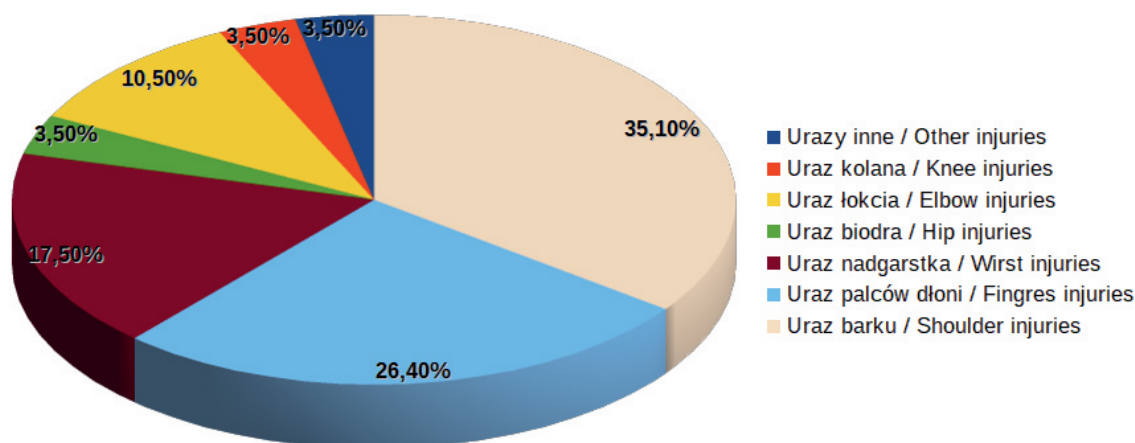


Fig. 3. Analysis of the most contiguous structures of water polo players

After injury, unfortunately in 42% of cases the examined water polo players did not use the help of a physiotherapist. 38% underwent physiotherapy, 13% underwent individual therapy, and 7% used other station exercises (Fig. 4).

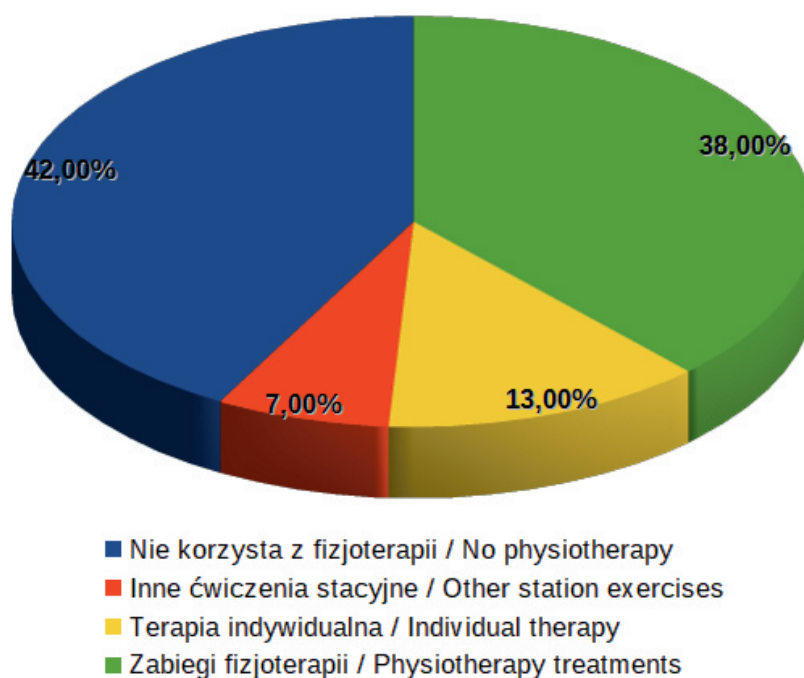


Fig. 4. Type of rehabilitation after injury

Discussion

Sports injuries constitute a risk inseparably connected with practicing sport, like any occupational risk. Both the etiology and pathomechanics of injuries are similar and it constitutes the result of a certain combination of circumstances. However,

apart from unfortunate accidents in selected disciplines, we usually deal with typical injuries resulting from overload of the musculo-skeletal system.

In the article by S. Motylewski, nineteen women were examined – players of the Kielce Handball Association (Superliga). All, i.e. 100% of players suffered at least one injury – the injuries concerned mostly the lower limbs (sprains and muscle injuries). 12.7% of all injuries ended with surgery, in other cases conservative treatment was provided. Despite complete healing, 68.4% of the female players felt discomfort after resuming training [10].

Also, in the article by G. Wójcik, who examined 31 female volleyball players, up to 97.6% of players suffered from injuries during their career. However, due to the specificity of this sport, the majority of injuries concerned the ankle (in 67.7% of players) [11].

Injuries result from the use of significant forces related to maximum effort in competition or training. Often, an athlete who has the chance to achieve a sports goal, for example: either to score a goal, or to avoid direct contact with the opponent of the opposing team, chooses a sports goal, somehow accepting the possibility of injury. A. Bania in his work quotes information that 62.5% of all injuries during the Summer Para-Olympic Games in London in 2012 were related to the violation of principles of a given sport [12].

N. Benjamin examined 36 men aged on average 16.9 (± 0.86) practicing water polo in Johannesburg in South Africa, among whom up to 33% of players reported shoulder injuries (in their own studies 35.1%). Excessive incidence of traumas of the body part resulted, according to the author, from greater pressure during training of water polo players on the upper body parts [13].

Similarly, E. Hams, monitoring 80 women and men practicing semi-professional water polo for four years, noted that 25% of injuries involved the shoulder joint; 2/3 resulted from overload during training. An injured player was assisted by a physiotherapist 10 days after the injury on average. The author believes that in order to restrict future injuries of this type, training must be optimized limiting the number of throws and shortening the time between the injury and receiving assistance from a physiotherapist [14].

The incidence of traumas in sports most often results from the lack of training of a players and concerns athletes who are not “mature” for sport, trying to make up for insufficient strength, speed, endurance and coordination with ambition. In the study conducted by M. Yaghouby, comparing muscle activity during throws of 12 water polo players and a control group of 10 people who are not involved in this discipline, it turned out that experienced water polo players activated the observed muscles in a specified sequence – from proximal to distal [15].

An important aspect is the access to comprehensive and professional physiotherapy as a process to bring about a complete restoration not only of the health condition that is possible to achieve, but also for a professional athlete to regain fitness allowing them to participate in competitions.

In the study conducted by S. Furgiel, who examined professional handball players of four teams of the Polish Superliga and First League (65 players), the rate of the incidence of traumas (ratio of the number of injuries during 1,000 hours to the actual time of exposure to injury) in the case when a physiotherapist was available to athletes every day, also during training, was 2.73, when a physiotherapist was available several times a month –

3.6, once in month – 5.26, and lack of access to a physiotherapist resulted in a ratio of 7.86. According to the author, the presence of a physiotherapist as well as screening tests significantly reduced the risk of injury of handball players [16]. In this study, it was found that 42% of water polo players after injury did not carry out any rehabilitation at all.

Only properly conducted treatment and improvement process will ensure that a player will return to complete fitness and will be able to continue his/her sports career after the injury. In order to protect the joint and periarticular structures against eccentric overload, eccentric exercises should be included in training. When the muscle is strong enough, it will also be more resistant to damage. Injuries arising as a result of overload lead to a reduction in the strength of muscles, tendons, ligaments and bones. A strong muscle provides protection for joint and periarticular structures [16].

Conclusions

1. Most often injuries occurred during training in the pool, which results from low reliability of warm-ups and exercises being incorrectly performed by the players.
2. The most vulnerable parts of the body are shoulder, wrist and finger joints.
3. Water polo is a contact game with a high level of the incidence of traumas, causing damage to joint capsules, stressing of ligaments and muscles in the above-mentioned parts of the body.
4. Increasing awareness and access to professional physiotherapy will allow athletes to return to fitness levels as before the injury more quickly and prevent further injuries.

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